

Abstract of the Disclosure

5 Genes and methods for optimizing levels of substrates employed in the biosynthesis of copolymers of 3-hydroxybutyrate (3HB) and 3-hydroxyvalerate (3HV) in plants and bacteria via manipulation of normal metabolic pathways using recombinant DNA techniques are provided. This is achieved through the use of a variety of wild-type and/or deregulated enzymes involved in the

10 biosynthesis of aspartate family amino acids, and wild-type or deregulated forms of enzymes, such as threonine deaminase, involved in the conversion of threonine to P(3HB-co-3HV) copolymer endproduct. By these methods, enhanced levels of threonine, α -ketobutyrate, propionate, propionyl-CoA, β -ketovaleryl-CoA, and β -hydroxyvaleryl-CoA are produced. Also provided are

15 methods for the biological production of P(3HB-co-3HV) copolymers in plants and bacteria utilizing propionyl-CoA produced through a variety of engineered metabolic pathways. Introduction into plants and bacteria of an appropriate β -ketothiolase, β -ketoacyl-CoA reductase, and PHA synthase, alone or in combination with various enzymes involved in aspartate family amino acid

20 biosynthesis and the conversion of threonine to PHA copolymer precursors, will permit these organisms to produce P(3HB-co-3HV) copolymers.